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J. JARRETT ET AL.
DISPENSER VALVE FOR CONTAINER FOR VISCOUS
FLUIDS UNDER PRESSURE

2,681,752

2 Sheets-Sheet 1

Fig 2

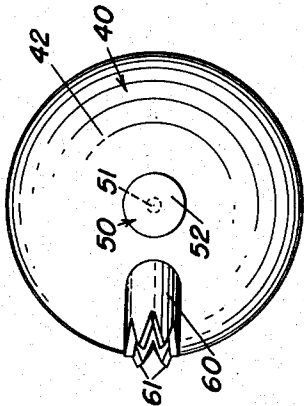


Fig 3

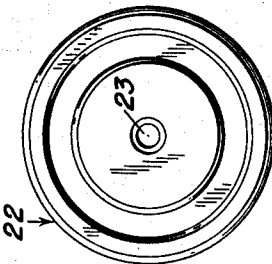


Fig 4

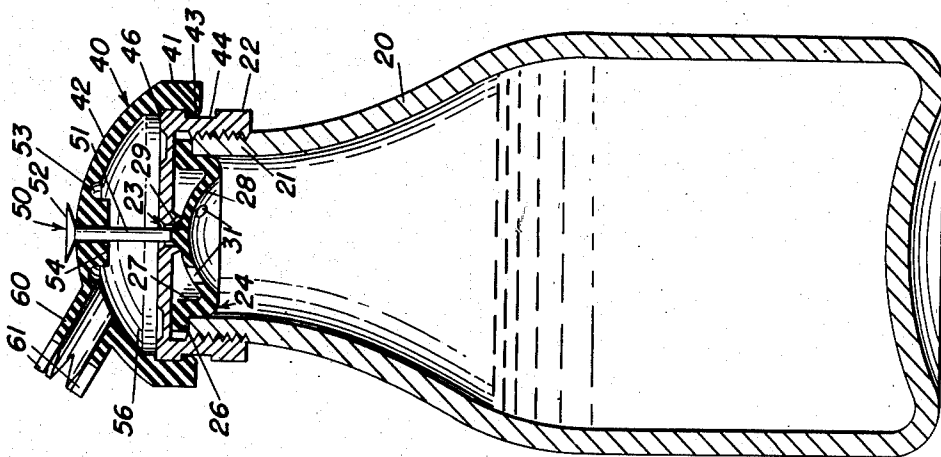
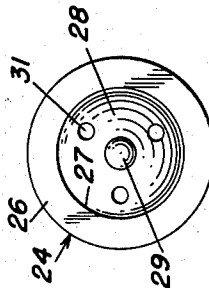


Fig 1

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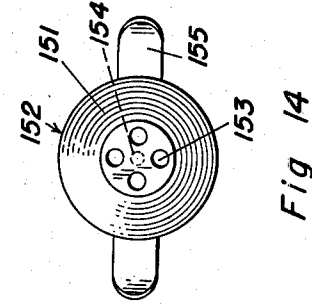
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UNITED STATES PATENT OFFICE

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DISPENSER VALVE FOR CONTAINERS FOR
VISCOUS FLUIDS UNDER PRESSURE

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10 Claims. (Cl. 222—394)

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This invention relates to new and useful improvements in dispenser valves for containers for viscous fluids under pressure. Reference is made to our copending patent applications Ser. No. 70,944, filed January 14, 1949, now Patent No. 2,613,016, issued October 7, 1952, for Dispenser for Viscous Liquids and Valve Therefor, and Ser. No. 70,945, filed January 14, 1949, now abandoned, for a Dispenser Cap for Viscous Fluids Under Pressure.

A principal object of the present invention is the provision of means for dispensing viscous liquids under pressure such as, for example, whipped cream, pancake and waffle mix, catsup, syrup, mayonnaise, soda water, etc. The invention is particularly adaptable for the dispensing of whipped cream from a container charged with a gas such as nitrous oxide or a blend of nitrous oxide and carbon dioxide under pressure. The particular invention resides in the closure and dispensing nozzle for the container.

One of the important features of the inventions is the construction of the resilient diaphragm interposed between the apertured cover and the container to close the aperture in the cover when no fluid is being dispensed.

The present invention is intended for use with any type of container suitable to withstand the pressures commonly employed in dispensing means of this general type, said container being provided with an apertured cap. Interposed between the cap and the container is a flanged, resilient diaphragm having a protuberance positioned and arranged so as normally to close off the aperture in the cap. Suitable means is provided so that when it is desired to dispense whipped cream or other substance the protuberance may be depressed thereby opening a passageway through the aperture in the cap. Above the cap is a suitable dispensing head which may be slipped over the cap and functions to direct the discharged liquid so that it may be deposited at the desired point. Incorporated in such head is a pin which may be depressed manually, said pin being positioned and arranged to project through the aperture in the cap, engage the protuberance on the diaphragm and depress the same so as to open a passageway to dispense the fluid.

The dispensing head is preferably formed of a resilient material. The head also is provided preferably with a nozzle which terminates in a flared serrated edge. If the nozzle is made of resilient material, said serrated edge assists in dispensing the viscous fluid in an attractive pattern such as that produced by a pastry tube.

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Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

Fig. 1 is a vertical section through a conventional type container for viscous fluids showing one form of the invention incorporated therein.

Fig. 2 is a plan of a dispensing head employed in the modification of Fig. 1.

Fig. 3 is a top plan of the apertured cap employed in the modification of Fig. 1.

Fig. 4 is a top plan of the flanged diaphragm employed in the modification of Fig. 1.

Fig. 5 is a vertical section through a modified container of conventional type showing a modified form of the invention incorporated therein.

Fig. 6 is a top plan of the dispensing head employed in the modification shown in Fig. 5.

Fig. 7 is a top plan of the diaphragm employed in the modification shown in Fig. 5.

Fig. 8 is a top plan of the apertured cap employed in the modification of Fig. 5.

Fig. 9 is a vertical section through the upper portion of a container employing another modified form of the invention.

Fig. 10 is a top plan of the dispensing head employed in the modification of Fig. 9.

Fig. 11 is a vertical section through still another modified dispensing head.

Fig. 12 is a top plan of the head shown in Fig. 11.

Fig. 13 is a vertical section through still another modified dispensing head.

Fig. 14 is a top plan of the dispensing head shown in Fig. 13.

It is now common practice to dispense whipped cream from a container for liquid cream charged with a gas such as nitrous oxide or a blend of nitrous oxide and carbon dioxide under pressure. The liquid cream is ejected from the container through a small aperture by action of the pressure of the gas, and upon passing through the aperture is aerated and expanded in volume. This means of dispensing whipped cream has numerous advantages, all of which are preserved and enhanced by the present invention. The same principle is used to dispense other viscous fluids in containers, such as, for example, pancake and waffle batter, catsup, mayonnaise, soda water, etc.

The present invention constitutes an improvement over such dispensing apparatus in that it affords a convenient, less expensive, more sani-

tary, simpler valve structure controlling the release of the viscous fluids than other structures commonly employed, together with a cooperating dispensing head fitting over the container closure, said head incorporating a dispensing nozzle of unique structure.

The invention is subject to considerable modification in that it is capable of being used with a wide variety of different containers and container caps and also a variety of dispensing heads. Thus in the modifications shown in Fig. 1, there is illustrated a conventional metal bottle 20 of size convenient for handling, said bottle having a neck 21 of reduced diameter, the outer surface of such neck being externally threaded for engagement with screw cap 22. Said cap is provided with an aperture 23 formed in the top surface, said aperture constituting an orifice through which is discharged the viscous fluid under gaseous pressure with which container 20 is filled. A resilient diaphragm member 24, preferably formed of rubber, is provided with an annular flange 26 dimensioned to be interposed between the top edge of neck 21 and the under-surface of the top of cap 22. Thus as cap 22 is screwed down on neck 21, flange 26 is pinched between the neck and cap, thereby acting as a gasket, sealing, off the leakage of fluid through the threaded connection between the cap and the neck. Flange 26 also functions to hold diaphragm 24 in proper position relative to cap 22. Below flange 26 is a short integral sleeve portion 27 of generally cylindrical configuration, the outer diameter of said sleeve portion being substantially equal to the inner diameter of neck 21. Diaphragm 24 is firmly and accurately seated in the container neck 21, and upon cap 22 being tightened, flange 26 locks said diaphragm in position. A spheroidal domed portion 28, with the dome pointed upward, constituted the central portion of diaphragm 24. A protuberance 29, which may be spheroidal in form, is located on the upper portion of dome 28, though not necessarily in the center thereof. A plurality of holes 31 is formed in dome portion 28, three holes, equally angularly spaced, as shown in Fig. 4. Obviously, more or less than three holes may be provided in the dome portion 28. The function of protuberance 29 will hereinafter appear. It will be observed, by reason of the resilient nature of dome 28 and its spheroidal form, that protuberance 29 is biased upward.

Cap 22 is provided with an aperture 23 positioned immediately above protuberance 29 in diaphragm 24, said aperture preferably being formed in a depressed dimple in the top surface of cap 22. The function of protuberance 29 is to close off aperture 23.

Fitting over the cap 22 is a dispensing head 40, said dispensing head having a cylindrical base 41 and a dome shaped top 42. The bottom rim of cylindrical portion 41 is provided with an inwardly disposed bend 43 adapted to project within a groove 44 in the exterior of cap 22 and also with an internal shoulder 46 engaging the upper edge of cap 22. By reason of the resiliency of the material from which head 40 is formed, bend 43 and shoulder 46 cooperate to form a tight seal between said head 40 and said cap 22.

Head 40 carries a pin 50, the diameter of the shank 51 of which being less than the diameter of the aperture 23 in cap 22. The upper end of pin 50 is provided with a circular head 52 which may be manually depressed. A circular groove 53 is cut around the boss 54 in the under-

side of dome 42 through which pin 50 projects, said groove 53 acting to impart resiliency in the region adjacent boss 54, thus biasing pin 50 upward from aperture 23.

As will be seen particularly with reference to Fig. 1 upon the container being inverted and head 52 of pin 50 being depressed manually, the opposite end of shank 51 projects through aperture 23 in cap 22 and engages protuberance 29 in diaphragm 24 so as to retract said protuberance from said aperture. Thereupon, fluid under pressure flows through holes 31 in the dome portion 28 of the diaphragm 24 and out through aperture 23 in cap 22 into the hollow chamber portion 56 of dispensing head 40. The diameter of shank 51 is sufficiently smaller than aperture 23 so as not to block flow of fluid. Aeration and expansion in volume takes place in the dispensing head when released from pressure to atmosphere. Thereby cream is turned into "whipped cream." Nozzle 60 communicating with chamber 56 directs emission of the viscous fluid from dispensing head 40. Upon release of pressure on head 52, pin 50 retracts by reason of the resiliency of boss 54 and the resiliency of dome 28 in diaphragm 24 thus forcing protuberance 29 upward to close off aperture 23 in cap 22 and stop flow of fluid. The fluid pressure within container 20 acts against the underside of protuberance 29 to assist in maintaining aperture 23 closed during intervals between dispensing, it being understood that the pressure on either side of dome 28 is equalized by reason of holes 31 in the dome 28.

Nozzle 60 in head 40 is preferably made of a resilient material, such as rubber, as is the rest of the dispensing head. The outer end of said nozzle is deeply serrated so that as the viscous fluid flows out through the nozzle, the resilient serrations 61 flare outward, which improves the appearance of the dispensed fluid as well as serving as a convenient means for directing said fluid in the desired place of deposit. Resilient serrations 61 tend to prevent the fluid from being ejected too rapidly, thereby preventing "squirting" thereof.

In the modification illustrated in Fig. 5, a modified form of container 70 is employed. Cap 71 is of the crown type, the skirt 72 of which is clinched over resilient bead 73 at the lip of the neck 74 of said container. Diaphragm 76 is similar in shape and function to diaphragm 24 shown in Figs. 1 and 4. Thus, there is provided an annular flange 77 which seats between the upper rim of bead 73 and the underside of the top of cap 71, functioning as a gasket assisting in sealing the container. Depending from said flange 77 is a short tubular portion 78 of cylindrical shape having an outside diameter substantially equal to the inner diameter of the bead 73 at the lip of neck 74, thereby accurately centering and locating said diaphragm 76 with respect to cap 71. A resilient dome 79 is disposed centrally of said diaphragm, pointing upward and having a protuberance 81 at or near its upper portion. Holes 82, two in number in this modification, are formed in dome portion 79.

Cap 71, which may be of a conventional crown cap type, is provided with aperture 91 located immediately above protuberance 81 so that the resiliency of diaphragm 76 tends to force protuberance 81 against said aperture 91 and close the container.

A dispensing head 96 is provided fitting over said cap 71 and sealing therewith, said head being

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generally semi-spheroidal in shape, with an inverted rim 77 adjacent its lower edge which fits over the lower edge of skirt 72 of crown cap 71 and prevents said head 96 from being forced away from cap 72. Pin 101 passes through boss 102 disposed internally of said dispensing head 96. Pin 101 is provided with an external head 103 at one end and the other end of the shank 104 thereof is of a diameter less than the diameter of aperture 91. Thus, when pin head 103 is manually depressed, shank 104 depresses protuberance 81 of diaphragm 76 and opens communications from container 70 through holes 82 in dome portion 79 of diaphragm 76 and thence through aperture 91 and into chamber 106 within head 96 and thence out through serrated nozzle 107, the shape thereof being generally similar to nozzle 60 of the modification shown in Figs. 1 and 2. The resiliency of diaphragm 76 and head 96 bias pin 101 outward when pressure against pin head 103 is released.

In Figs. 9 and 10 is shown a modified form of dispenser head 120. Said head 120 is in the form of a cylindrical shell having skirt 121 with an internal diameter such as to form a tight seal when said head is forced over skirt 72 of crown cap 71 of the container. Hook 122 is fixed to the bottom of skirt 121, said hook being formed so as to fasten under the bottom edge of the skirt 72 of cap 71. Diametrically opposite said hook 122 is finger hold 123 fixed to the upper edge of skirt 121 which may be manually depressed. Pin 126 is embedded in the top of the head 120, said pin having its shank positioned immediately above, and of a diameter such as to project within aperture 91 in cap 120 and thus depress protuberance 81 in diaphragm 76. Nozzle 130 communicating with the interior chamber 131 of head 120 is of the general configuration of nozzle 107 shown in the modification of Figs. 5 and 6. In use, head 120 is slipped over crown cap 71 and the operator then depresses finger hold 123 which forces pin 126 against protuberance 81 and establishes communication from the interior of the container through holes 82, through aperture 91, through chamber 131, and thence out through nozzle 130.

The modification shown in Figs. 11 and 12 employs a shell-like head 135 having two diametrically opposed finger holds 136 fixed to the lower edge of skirt 137 of head 135. The interior of skirt 137 slips tightly over an apertured cap (not shown) on the container. Pin 138 is embedded in the top of head 135, said pin functioning in a manner similar to pin 126 in the modification shown in Fig. 9. Instead of a nozzle such as 130 or 107, a plurality of holes 139 is placed in the top flat surface 141 of head 135 so that fluid is ejected through said holes 139 upon communication being established with the interior of the container. It will be observed that preferably the sides of head 135 are tapered inwardly as shown by reference numeral 142 so as to direct said fluid toward said holes 139. In use, the operator places head 135 over the crown cap and then by the use of two fingers, one on each of the finger holds 136, forces said head 135 downwardly toward the neck of the container, the shank of pin 138 penetrating the aperture in the cap and depressing the protuberance of a diaphragm beneath the crown cap, thereby permitting fluid to flow out through holes 139 in the top of head 135.

The modification shown in Figs. 13 and 14 is quite similar in construction to that shown in

Figs. 11 and 12, except that whereas head 135 is shallow, the inwardly inclined portion 151 of head 152 is elongated so that head 135 assumes the shape of an elongated, truncated, conical section. The centrally disposed holes 153, pin 154 and diametrically opposed finger holds 155 are similar to the corresponding elements shown in Figs. 11 and 12.

It will be understood that all of the dispensing heads heretofore described are preferably removable so that when the container is empty, it may be discarded or returned for refilling, whereas the dispensing head may be used with a fresh container. It will further be observed that since the dispensing head is removable, it may be removed and cleaned frequently, thereby preventing the growth of bacteria within the head and atop the cap. The only exposed portion of the diaphragm is the protuberance projecting through the aperture in the cap and this also may readily be cleaned. The interior of the container is sealed at all times except when the contents are being dispensed.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention and scope of the claims appended hereto.

We claim:

1. A dispensing valve for a pressurized fluid container comprising; an apertured cap for said container and an apertured resilient diaphragm within said container fixed adjacent said cap, said diaphragm comprising an annular flange dimensioned to form a sealing gasket between said cap and said container, a central apertured portion on said diaphragm, a protuberance on said central portion positioned for closing the aperture in said cap, said diaphragm being biased toward said cap, an outer apertured hollow member enclosing said cap, and means carried by said outer member positioned to contact said protuberance so that said diaphragm may be depressed by manual operation of said last named means.

2. A dispensing valve for a pressurized fluid container comprising; an apertured cap for said container and an apertured diaphragm within said container fixed adjacent said cap, said diaphragm comprising an annular flange dimensioned to form a sealing gasket between said cap and said container, a sleeve portion depending from said flange, a central apertured domed portion joined at its lower edge to the lower edge of said sleeve portion, a protuberance on said central portion positioned for closing the aperture in said cap, said diaphragm being biased toward said cap, there being a cavity of substantial volume at all times above said domed portion and under said cap, said cavity providing a passageway from the aperture in said domed portion to the aperture in said cap.

3. In combination, a pressurized fluid container, an apertured cap for said container and an apertured resilient diaphragm within said container fixed adjacent said cap, said diaphragm comprising means locating said diaphragm relative to said cap and a protuberance for closing the aperture in said cap, said diaphragm being positioned and arranged to bias said protuberance toward said aperture at least one aperture in said diaphragm, an apertured dispensing head fitting over and sealing around said cap, said

head including a resilient dome portion, a pin depending from said dome portion manually operable for retracting said protuberance from the aperture in the cap to establish communication between the interior of said container and the atmosphere, said resilient dome portion biasing said pin away from said protuberance.

4. In combination, a pressurized fluid container, an apertured cap for said container and an apertured, resilient diaphragm within said container fixed adjacent said cap, said diaphragm comprising means locating said diaphragm relative to said cap and a protuberance for closing the aperture in said cap; said diaphragm being positioned and arranged to bias said protuberance toward said aperture at least one aperture in said diaphragm, an apertured dispensing head fitting over and sealing around said cap, said head including a resilient dome portion, a nozzle communicating from said dome and terminating in a plurality of deep, resilient serrations, a pin depending from said dome portion manually operable for retracting said protuberance from the aperture in the cap to establish communication between the interior of said container and the atmosphere.

5. A resilient diaphragm for sealing an apertured cap to a container comprising an annular flat, laterally extending flange adapted to be clinched between the container rim and the cap, a short cylinder sleeve portion depending from said flange, an upwardly pointed dome portion centrally disposed and joined at its lower edge to the lower edge of said sleeve portion, at least one aperture in said dome portion and an upwardly directed protuberance on the upper surface of said dome portion extending above the level of said flange, the space above said domed portion and under the level of said flange being of a substantial volume, both when said protuberance is elevated and when said protuberance is depressed.

6. In a container for pressurized fluid, a dispensing head, an apertured cap over which said head fits, said cap having a skirt, said dispensing head comprising a central chamber-forming portion, a skirt depending from said chamber-forming portion adapted to fit snugly about said skirt of said cap, an aperture in said chamber-forming portion, an apertured resilient diaphragm dis-

posed below said cap and having a protuberance on the upper surface thereof closing the aperture in said cap, and a pin carried by said chamber-forming portion, positioned when depressed to contact said protuberance and open said aperture in said cap.

7. The combination of claim 6 in which is further provided a hook on the lower edge of said skirt of said head directed inwardly to engage under the lower edge of said cap, and a finger hold substantially diametrically opposite said hook whereby manual pressure on said finger hold forces said pin downwardly.

8. The combination of claim 6 in which is further provided a plurality of finger holds at least two of which are diametrically opposed on the lower edge of said skirt of said head, and in which said chamber-forming portion is in the form of a truncated, blunt cone, said pin being embedded in the truncated end and in which said aperture is located in said truncated end.

9. The combination of claim 6 in which is further provided a plurality of finger holds at least two of which are diametrically opposed on the lower edge of said skirt of said head, and in which said chamber-forming portion is in the form of a truncated, elongated cone, said pin being embedded in the truncated end and in which said aperture is located in said truncated end.

10. The combination of claim 6 in which is further provided a plurality of finger holds at least two of which are diametrically opposed on the lower edge of said skirt of said head, and in which said chamber-forming portion is in the form of a truncated cone, said pin being embedded in the truncated end and in which said aperture is located in said truncated end.

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